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right hind foot to aid his jaws, grasping his abdomen with his foot, and, by a little effort, getting hold of the worm in his stomach from the outside; he thus by his foot held fast to what he gained by each swallow, and presently succeeded in getting the worm entirely down.

A garter-snake was observed this summer in North Conway pushing a toad down his throat by running it against clods and stones; just as the toad crowds down a locust.

The amount which a toad can eat is surprising. One Tuesday morning I threw a *Coreus tristis* to a young toad, he snapped it up, but immediately rejected it, wiped his mouth with great energy, and then hopped away with extraordinary rapidity. I was so much amused that I gathered some more of the same bug and carried them to a favorite old toad at the northeast corner of my house. He ate them all without making any wry faces. I gathered all that I could find on my vines, and he ate them all, to the number of twenty-three. I then brought him some larvæ of *Pygæra ministra*, three-quarters grown, and succeeded in enticing him to put ninety-four of them on top of his squash bugs. Finding that his virtue was not proof against the caterpillars when I put them on the end of a straw and tickled his nose with them, he at length turned and crept under the piazza, where he remained until Friday afternoon, digesting his feast.

A gentleman having read this paper told me he had seen the toad tuck in the last inch of an earth worm with his hand, European fashion. I then remembered that I have several times seen our toad put the last quarter-inch of earthworms in with his hand; but never saw him take his hand to a locust.

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## ON SECTION AVICULARIA OF THE GENUS POLYGONUM.

BY SERENO WATSON.

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MEISNER'S *Polygonum* § *Avicularia* is equivalent nearly to section *Polygonum* of Linnæus, the original genus *Polygonum* of Tournefort and Adanson, to which Linnæus added, as coördinate sections, *Persicaria*, *Bistorta* and some other old genera. Its most dis-

tinctive characteristics are the leaf jointed upon the petiole at the point of divergence from the sheath; the broadly dilated filaments of the three inner stamens; and the incumbent cotyledons. Of these the first occurs in no other section of the genus, excepting § *Tephis*, of a single species, but is found in *Atraphaxis*, *Thysanella* and *Polygonella*, of the subtribe *Rumiceæ*. The second is also peculiar to § *Tephis*, but exists in *Atraphaxis* and a section of *Polygonella*; while the third, occurring besides only in § *Amblygonon* of *Polygonum*, is characteristic of *Rumex*, *Atraphaxis*, *Thysanella* and some species of *Polygonella*. The closest affinity of the section is to the genus *Atraphaxis*, which has also perfect flowers and the same peculiar stipular sheaths, and from which it is distinguished mainly by its more or less herbaceous sepals not enlarging or deflexed in fruit but appressed to the achenium. It would seem that the genus *Polygonum* should be restricted to the two sections *Avicularia* and *Tephis*, on account of this, in these respects, nearer relationship to the *Rumiceæ* than to the other sections with which they are at present united.

The species *P. articulatum*, which was long retained in § *Avicularia*, but referred by Meisner to *Polygonella*, and restored by Dr. Gray to *Polygonum* as § *Pseudo-polygonella*, must be placed with *Polygonella ericoides* (which includes *P. Meisneriana*), having a similarly excentric embryo, somewhat contorted, and the cotyledons either accumbent or incumbent. Its scarcely dilating inner sepals are those of *Polygonella polygama* (*P. parvifolia*), and its colored marcescent calyx, the solitary flowers upon elongated pedicels jointed near the middle, and the peculiar floral sheaths, are common to all the species of *Polygonella* in contradistinction to those of *Polygonum*.

The section *Avicularia* and the North American species belonging to it may be defined and arranged as follows:—

§ AVICULARIA, Meisn. Calyx more or less herbaceous, at length connivent upon the achenium, 5- or rarely 6- parted; stamens 5-8, sometimes but 3, the filaments opposite to the inner sepals broadly dilated; achenium 3-angled; albumen horny; embryo lateral with incumbent cotyledons. Herbaceous, or somewhat woody at base, never climbing nor aquatic; leaves jointed upon the short petiole; stipules hyaline at least above the sheath, the lateral lobes entire or bifid, at length lacerate; flowers axillary or apparently spicate by the abortion of the floral leaves, cymosely fascicled in the sheaths or rarely solitary, the pedicels jointed to the short base of the calyx; bractlets hyaline.

\* Smooth perennials (*P. maritimum* sometimes annual), the chestnut-brown stems somewhat woody at base, the slender branches leafy to the top; leaves thick; stipules conspicuous; calyx mostly colored, rather large and open, exceeding the lanceolate smooth achenium and loosely appressed to it; stamens 8.

1. *P. BOLANDERI*, Brewer, *Proc. Amer. Acad.*, viii, 400. — Stems erect, very slender, 6-15' high, nearly naked, with short simple densely leafy branches above; leaves narrowly linear, 2-4" long, often cuspidate; stipules about equalling the leaves, finely lac-erate; flowers mostly solitary, 1½" long, light rose-color; styles half as long as the ovary.— Sacramento Valley, California.

2. *P. SHASTENSE*, Brewer, *l. c.*— Prostrate or ascending, the branches 2-6' long, usually naked; joints very short; the lacerate lobes of the stipules mostly deciduous from the herbaceous sheath; leaves oblanceolate, 4-6" long, often folded, not revolute; flowers 1-3 in the lower axils of the leaves, which crowd the ends of the branches, deep rose-color, 1½-2½" long on exerted pedicels; styles much shorter than the ovary.— In the Sierra Nevada, California.

3. *P. PARONYCHIA*, Cham. and Schlecht.— Prostrate, the branching stems 1-3° long; leaves linear-lanceolate, ½-1' long, acute, the margins revolute; flowers densely crowded at the ends of the branches, rose-color, 3" long; styles as long as the ovary.— On the seacoast from San Francisco to Puget Sound.

4. *P. MARITIMUM*, L.— Prostrate, glaucous, stems ½-1½° long, very shortly jointed; leaves oval to linear-oblong, 3-10" long; flowers 1-1½" long, on mostly exerted pedi-cels; achenium equalling or slightly exceeding the sepals.— On the seacoast from Mas-sachusetts to Georgia; usually annual in the more northern localities; not distinguish-able from the Old World species.

\* \* \* Annuals, with striate stems leafy throughout; calyx colored upon the margins, becoming closely appressed; styles short.

5. *P. AVICULARE*, L.— Mostly prostrate or ascending, glabrous, bluish-green, the branches slender and elongated; leaves oblong to lanceolate, 3-10" long, usually acute or acutish; flowers rarely 1" long, pinkish-white, the pedicels not exerted, stamens 8 or rarely 5; achenium broadly ovate, 1" long or less, dull and minutely granular.— Common about yards and roadsides; probably not indigenous.

6. *P. ERECTUM*, L.— Stout, erect or ascending, glabrous, 1-2° high or more, yellow-ish; leaves oblong or oval, ½-2½" long, usually obtuse; flowers mostly 1½" long, often yellowish, on more or less exerted pedicels; sepals rarely 6; stamens 5-6; achenium broadly ovate to lanceolate, dull and granular or nearly smooth.— From the Eastern States and Canada to Nevada and Oregon; a strictly American form.

7. *P. MINIMUM*, Watson, *King's Rep.*, v, 315.— Somewhat scabrous-puberulent; stems very slender, decumbent or ascending, 6-15' long (or an alpine form, very dwarf), brownish and often flexuous; leaves ovate to lanceolate, 2-8" long, acute at each end and sometimes cuspidate; flowers in all the axils, 1" long or usually less, light rose-color, on very slender exerted pedicels; stamens 8; styles short; achenium smooth and shining, exceeding the calyx.— In Oregon (Pickering, 452 Hall), and in the Wah-satch and Uintas at 9-11,000 feet altitude.

8. *P. TORREYI*.— Closely resembling the last, but perfectly smooth; the flowers mostly near the ends of the branches and nearly sessile in the axils of the crowded leaves; stamens 6; achenium considerably exceeding the calyx.— Collected by Dr. Torrey in the Yosemite valley.

\* \* \* Annuals with striate stems, the branches slender and virgate, angular; leaves diminishing upward and becoming bractlike, the spikelike inflorescence more or less interrupted.

9. *P. RAMOSISSIMUM*, Michx.— Erect or ascending, 2-4° high, glabrous, yellowish; leaves lanceolate to linear, 1-2½" long, acute; flowers and achenium as in *P. erectum*, but the sepals more frequently 6, the stamens 3-6, and the achenium mostly smooth and shining.— From the northern Atlantic States to the Saskatchewan and the Pacific.

10. *P. TENUE*, Michx.— Erect, ½-1½° high, glabrous or rarely slightly scabrous at the nodes; leaves linear to lanceolate, 1-2' long, acute at each end and often cuspidate, obscurely 3-nerved; flowers often solitary, 1-2" long, deflexed in fruit, the sepals margined with white or pink; stamens 8; styles much shorter than the ovary; achenium ovate, black and shining.— From Canada to the Carolinas and west to Oregon. Var. *LATIFOLIUM*, Engelm., has broader leaves and more numerous flowers; Var. *MICROSPERMUM*, Engelm., is a low slender form, with minute flowers and fruit, perhaps distinct; both occur in the Rocky Mountains.

11. *P. CAMPORUM*, Meisn.—Smooth, erect or ascending, 2-3' high, the branches short-jointed and branchlets mostly terete; leaves linear-lanceolate, 1-2' long, acute, or sometimes oblong, but  $\frac{1}{2}$ ' long and obtuse; bracts hardly exceeding the flowers; pedicels slender, exerted from the short sheaths; sepals colored,  $\frac{3}{4}$ -1" long; stamens 8; styles nearly equalling or at least half as long as the achenium; fruit less deflexed than in the last.—Texas to Kansas. Meisner was mistaken in classing this with the perennial species, and perhaps also in referring to it the South American var. *australe*.

12. *P. COARCTATUM*, Dougl.—Resembling *P. tenue*, but scabrous-puberulent, the stems often brown; leaves linear, acute, 1-nerved; spike usually rather dense; calyx more petaloid and conspicuous, 1-2" long; styles as long as the ovary.—From Puget Sound and central Idaho to the Sacramento.

\*\*\* Low slender annuals, the spikes short and dense, and the bracts imbricated; sepals colored.

13. *P. POLYGALOIDES*, Meisn.—Stems 2-6' high, smooth, branching; leaves narrowly linear,  $\frac{1}{2}$ -1' long, acute; spikes dense, 3-8" long, the bracts closely imbricated, 2" long, oblong to nearly orbicular, with broad scarious margins, mostly obtuse; stipules lanceolate, entire or lacerate; sepals 1" long or less; stamens 8; styles as long the ovary; achenium  $\frac{3}{4}$ " long, minutely tuberculate-striate or smoothish.—Collected only by Spalding and Pickering, in Oregon and central Idaho.

14. *P. IMBRICATUM*, Nutt., in herb.—Resembling the last; often diffusely branched, 1-8' high; bracts loosely imbricated, linear or oblong, 2-4" long, with sometimes a narrow scarious margin, acute; stamens 3 or 5; styles one-third as long as the ovary.—Frequent in the mountains, alpine and sub-alpine, from Colorado to Oregon and northern California. It has usually been considered a form of *P. coarctatum*.

Meisner refers also to this section his *P. Californicum*, founded upon 1944 Hartweg, without fruit. It is separated, however, by every character but habit, and the remarkable peculiarities of the achenium require that it should be placed in a distinct section, not very closely allied to any other in the genus, as follows:—

§ *DURAVIA*. Sepals 5, colored, becoming somewhat appressed to the achenium; stamens 8, the three inner filaments but slightly dilated at base; styles 3, the stigmas capitate; achenium membranous, linear, nearly terete, obscurely 3-angled; embryo lateral; cotyledons accumbent; flowers in slender many-jointed interrupted spikes, mostly solitary and nearly sessile in the sheaths; the scarious stipules not lobed, finely lacerate; leaves linear, not jointed upon the petiole.

1. *P. CALIFORNICUM*, Meisn.—Annual, erect, very slender, 3-6' high, minutely scabrous-puberulent, brownish, the branches mostly floriferous their entire length; leaves linear to filiform, 6-15" long, cuspidate; bracts 1-2" long, 3-nerved, but little exceeding the stipules; calyx 1" long, rose-color; styles much shorter than the ovary; achenium slightly exerted, the light-colored pericarp thinly membranous, rather closely enveloping the terete seed, with slightly raised angles; testa reddish.—On dry hills bordering Sacramento and Napa Valleys, California.